

DWG NO <b>277-0672</b>	SH <b>1</b>	REVISIONS																											
<b>NOTES:</b> DRAWING PREPARED IN ACCORDANCE WITH DOD-STD-100.		LTR	DESCRIPTION	DATE	APVD																								
		G	AZ1186 - REV P 1, 3	94-12-12	SMH																								
		H	AZ3751 - REV P 1, 3, 12	96-08-30	SMH																								
		J	RR6165 - MISCELLANEOUS	02-10-21	BTM																								
STATEMENT A, UNLIMITED																													
<p>1.0      <u>SCOPE:</u> THIS DRAWING DETAILS THE REQUIREMENTS FOR A CRYSTAL CONTROLLED OSCILLATOR. FOR PORTABLE AND AIRBORNE APPLICATION, WITH A VERY RAPID WARM-UP TIME AND LOW POWER CONSUMPTION.</p> <p>THE PART NUMBER IS THE SEVEN (7) DIGIT DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER AS SPECIFIED IN TABLE I.</p> <p>PARAGRAPH(S), TABLE(S) AND/OR FIGURE(S) FOLLOWED BY "I" INDICATE A CHANGE BY THE LATEST REVISION.</p> <p>ALL SHEETS ARE THE SAME REVISION STATUS.</p>																													
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">McCOY ELEC. MT. HOLLY SPRINGS, PA</td> <td style="width: 15%;">00136</td> <td style="width: 20%;">SEE TABLE I</td> <td style="width: 25%;">TA</td> </tr> <tr> <td>PIEZO TECH. INC., ORLANDO, FL</td> <td>25120</td> <td>SEE TABLE I</td> <td>TA</td> </tr> <tr> <td>DYNAMICS CORP. OF AMERICA, REEVES-HOFFMAN DIV., CARLISLE, PA</td> <td>82567</td> <td>SEE TABLE I</td> <td>TA</td> </tr> <tr> <td><b>SUGGESTED SOURCES OF SUPPLY</b></td> <td><b>CAGE CODE</b></td> <td><b>VENDOR PART NO</b></td> <td><b>CAL</b></td> </tr> </table>						McCOY ELEC. MT. HOLLY SPRINGS, PA	00136	SEE TABLE I	TA	PIEZO TECH. INC., ORLANDO, FL	25120	SEE TABLE I	TA	DYNAMICS CORP. OF AMERICA, REEVES-HOFFMAN DIV., CARLISLE, PA	82567	SEE TABLE I	TA	<b>SUGGESTED SOURCES OF SUPPLY</b>	<b>CAGE CODE</b>	<b>VENDOR PART NO</b>	<b>CAL</b>								
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CONTRACT NO PREP S. K. McKEE 89-05-05 CHK J. D. HOWLETT 89-05-05 APVD D. FORSETH 89-05-05		<table style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="4" style="text-align: center;"><b>ROCKWELL INTERNATIONAL CORPORATION</b></td> </tr> <tr> <td colspan="4" style="text-align: center;">COLLINS AVIONICS &amp; COMMUNICATIONS DIVISION</td> </tr> <tr> <td colspan="2" style="text-align: center;">350 COLLINS ROAD N E</td> <td colspan="2" style="text-align: center;">CEDAR RAPIDS, IA 52498</td> </tr> <tr> <td colspan="4" style="text-align: center; font-size: 1.2em;"><b>OSCILLATOR, CRYSTAL CONTROLLED</b></td> </tr> <tr> <td style="width: 10%;">SIZE <b>A</b></td> <td style="width: 20%;">CAGEC <b>13499</b></td> <td style="width: 40%;">DWG NO <b>277-0672</b></td> <td style="width: 10%;">REV <b>J</b></td> </tr> <tr> <td colspan="2">SCALE NONE</td> <td colspan="2">SHEET 1 OF 20</td> </tr> </table>				<b>ROCKWELL INTERNATIONAL CORPORATION</b>				COLLINS AVIONICS & COMMUNICATIONS DIVISION				350 COLLINS ROAD N E		CEDAR RAPIDS, IA 52498		<b>OSCILLATOR, CRYSTAL CONTROLLED</b>				SIZE <b>A</b>	CAGEC <b>13499</b>	DWG NO <b>277-0672</b>	REV <b>J</b>	SCALE NONE		SHEET 1 OF 20	
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DWG NO 277-0672 SH 2

2.0 APPLICABLE DOCUMENTS: THE FOLLOWING DOCUMENTS OF THE ISSUE IN EFFECT FORMS A PART OF THIS DRAWING TO THE EXTENT SPECIFIED HEREIN.

MILITARY SPECIFICATION

MIL-O-55310

OSCILLATORS, CRYSTAL GENERAL  
SPECIFICATION FOR

MILITARY STANDARD

MIL-STD-202

TEST METHOD STANDARD ELECTRONIC AND  
ELECTRICAL COMPONENT PARTS

ROCKWELL COLLINS DRAWINGS

(357-0551-020)

RF CONNECTOR SPECIFICATION

(371-2649-020)

POWER CONNECTOR SPECIFICATION

3.0 REQUIREMENTS:

3.1 ELECTRICAL: (UNLESS OTHERWISE SPECIFIED, ELECTRICAL REQUIREMENTS APPLY OVER THE ENTIRE TEMPERATURE RANGE SPECIFIED.)

3.1.1 DIRECT CURRENT (DC) INPUTS:

3.1.1.1 INPUT VOLTAGE:  $V_1=19.0$  TO  $21.6$  VOLTS (V) DC  
 $V_2=11.0$  TO  $16.0$  V DC

3.1.1.2 SUPPLY RIPPLE AND NOISE: 200 MILLIVOLTS (mV) PEAK TO PEAK SQUARE WAVE AT ANY FREQUENCY BETWEEN 100 HERTZ (Hz) AND 12.0 MEGAHERTZ (MHz).

3.1.1.3 INPUT POWER: MAXIMUM DEMAND DURING WARM-UP: 20 WATTS WITH  $V_1$  EQUAL TO 20 V DC; AFTER WARM-UP: 1.92 WATTS MAXIMUM AT  $-40^\circ\text{C}$  WITH AMBIENT FORCED AIR COOLING AND  $V_1$  EQUAL TO 20 V DC.

3.1.1.4 INPUT PROTECTION: OPENING OF A POWER SUPPLY OR GROUND CONNECTION DURING OPERATION MUST NOT CAUSE DAMAGE.

3.1.1.5 INPUT CURRENT:  $I_1$ : 1.0 AMPERE (A) MAXIMUM OVER THE  $V_1$  RANGE.  
 $I_2$ : 20 MILLIAMPERE (mA) MAXIMUM OVER THE  $V_2$  RANGE.

3.1.2 RADIO FREQUENCY (RF) OUTPUT: MAY BE DC OPEN, OR DC COUPLED TO GROUND.

3.1.2.1 FREQUENCY ( $f_o$ ): 10.949297 MHz.

3.1.2.1.1 FREQUENCY TOLERANCE:  $f_o \pm 3 \times 10^{-7}$  AT  $+25^\circ\text{C} \pm 3^\circ\text{C}$  AT THE TIME OF SHIPPING.

3.1.2.2 RF OUTPUT POWER:  $-1$  DECIBEL REFERENCED TO ONE MILLIWATT (dBm) TO  $+2$  dBm INTO A  $50 \pm 5\%$  OHM RESISTIVE LOAD.

SIZE <b>A</b>	CAGEC <b>13499</b>	DWG NO <b>277-0672</b>	REV <b>J</b>
SCALE NONE		SHEET <b>2</b>	

3.1.2.2.1 START UP TIME: RF OUTPUT POWER SHALL BE A MINIMUM OF -4 dBm WITHIN 3 SECONDS OF THE APPLICATION OF  $V_1$  AND  $V_2$  AND MEET THE REQUIREMENTS OF 3.1.2.2 HEREIN WITHIN 4 MINUTES OF THE APPLICATION OF THE MINIMUM INPUT VOLTAGES ( $V_1$  AND  $V_2$ ) IN ACCORDANCE WITH 3.1.1 HEREIN. THIS START-UP REQUIREMENT MUST BE MET WITH THE VOLTAGE APPLIED AS ANY ARBITRARY FUNCTION VERSUS TIME (ie: RAMP, STEP). TIME ZERO IS DEFINED AS THAT TIME WHEN  $V_1$  AND  $V_2$  BOTH REACH THEIR MINIMUM INPUT VOLTAGES.

3.1.2.3 OUTPUT PROTECTION: RF OUTPUT MUST BE NORMAL AFTER BEING SHORTED TO THE SUPPLY VOLTAGES OR TO GROUND FOR 5 SECONDS.

3.1.2.4 LOAD VOLTAGE STANDING WAVE RATIO (VSWR): RF OUTPUT MUST WITHSTAND CONTINUOUS APPLICATION OF LOADS OF ANY VSWR. (UNTERMINATED (OPEN) RG-58 COAXIAL CABLE OF ANY LENGTH UP TO 32 FEET).

3.1.2.5 RF GROUND: THE SHELL OF THE RF CONNECTOR SHALL BE CONNECTED TO CASE GROUND.

3.1.3 WARM-UP TIME: FROM A SIX (6) HOUR MINIMUM OFF COLD SOAK AT -40°C, THE FREQUENCY AFTER 4 MINUTES SHALL BE WITHIN  $3 \times 10^{-8}$  OF FREQUENCY AFTER 30 MINUTES. THE RATE OF CHANGE OF FREQUENCY AFTER 4 MINUTES SHALL NOT EXCEED  $1 \times 10^{-9}$ /SECONDS.

3.1.4 FREQUENCY STABILITY:

3.1.4.1 LONG TERM AGING: AT TIME OF SHIPPING:  $2 \times 10^{-8}$ /WEEK MAXIMUM AFTER 24 HOURS OF CONTINUOUS OPERATION.

THE ABOVE AGING FIGURES APPLY ONLY DURING CONTINUOUS OPERATION. WHEN A UNIT IS OFF POWER FOR ANY PERIOD OF UP TO 30 DAYS, THE FREQUENCY 30 MINUTES AFTER TURN-ON SHALL BE WITHIN  $1 \times 10^{-8}$  OF THE FREQUENCY AFTER TURN-OFF BASED ON STORAGE AT +25°C. FOR LONGER OFF PERIODS THE ABOVE OFFSET SHALL NOT INCREASE BY MORE THAN  $1 \times 10^{-9}$ /WEEK.

3.1.4.2 FREQUENCY/TEMPERATURE STABILITY:  $\pm 3 \times 10^{-8}$  MAXIMUM OVER THE RANGE -54°C TO +85°C. ADDITIONALLY THE RATE OF FREQUENCY CHANGE SHALL NOT EXCEED  $1 \times 10^{-9}$ /SECOND FOR A TEMPERATURE RATE CHANGE OF 5°C/MINUTE OR LESS FROM -54°C TO +85°C.

3.1.4.3 VOLTAGE STABILITY:  $\pm 1 \times 10^{-9}$  PER VOLT FOR THE INPUT VOLTAGE RANGE SPECIFIED

3.1.4.4 LOAD STABILITY:  $\pm 1.5 \times 10^{-8}$  FOR ANY LOAD VSWR LESS THAN OR EQUAL TO 2.

3.1.4.5 SHORT TERM STABILITY:

$1.0 \times 10^{-10}$  ROOT MEAN SQUARE (RMS) FOR 0.2 SECOND MEASUREMENTS  
 $3.0 \times 10^{-11}$  RMS FOR 1.0 SECOND MEASUREMENTS  
 FOR THIS MEASUREMENT, THE SQUARE ROOT OF THE ALLAN VARIANCE, WITH 100 OR MORE SAMPLES, MAY BE USED.

- 3.1.4.6 SHORT TERM FREQUENCY DRIFT:  $\pm 3 \times 10^{-9}$  FOR 20 MINUTES AT A CONSTANT TEMPERATURE AND AFTER 30 MINUTES WARM-UP. PRIOR TO THE TEST, THE OSCILLATOR SHALL BE SUBJECTED TO A 24 HOUR MINIMUM "ON" PERIOD AT ROOM TEMPERATURE FOLLOWED BY A 24 HOUR MINIMUM "OFF" PERIOD AT  $-40^{\circ}\text{C}$ . THE OUTPUT FREQUENCY SHALL BE MEASURED USING A TECHNIQUE WHICH RESULTS IN A RESOLUTION OF  $\pm 1 \times 10^{-10}$  AND A MINIMUM ACCURACY OF  $\pm 2.5 \times 10^{-10}$ .
- 3.1.4.7 FREQUENCY SHIFT DUE TO SHOCK SHALL BE LESS THAN  $\pm 1.5 \times 10^{-7}$ .
- 3.1.4.8 ACCELERATION SENSITIVITY:  $3 \times 10^{-10}/\text{G}$  MAXIMUM IN THE DIRECTION OF THE LONGEST AXIS.  $2 \times 10^{-9}/\text{G}$  MAXIMUM IN THE DIRECTION OF THE TWO SHORTER AXES. MEASUREMENT SHALL BE PERFORMED IN A MANNER WHICH EXCLUDES THERMAL EFFECTS.
- 3.1.5 FREQUENCY ADJUSTMENT:
- 3.1.5.1 (-010 AND -030 ONLY):
1. CONTROL: SCREWDRIVER SLOT ADJUSTMENT.
  2. RANGE:  $\pm 1 \times 10^{-6}$  MINIMUM ( $\pm 10.95 \text{ Hz}$ ); OR SUFFICIENT RANGE TO COMPENSATE FOR FREQUENCY DRIFT RESULTING FROM INTERMITTENT OPERATION OVER A PERIOD OF 15 YEARS. IN LATTER CASE, VENDOR MUST SUPPLY WORST CASE ANALYSIS TO JUSTIFY CHOICE OF ADJUSTMENT RANGE.
  3. RESOLUTION: SUFFICIENT TO MEET 3.1.2.1.1 SPECIFIED HEREIN.
- 3.1.5.2 (-020 ONLY): FREQUENCY ADJUSTMENT IS NOT REQUIRED PROVIDED THE VENDOR SUPPLIES WORST CASE ANALYSIS DEMONSTRATING THAT INTERMITTENT OPERATION OVER A PERIOD OF 15 YEARS WILL NOT CAUSE THE OUTPUT FREQUENCY TO EXCEED THE RANGE OF  $10.949297 \text{ MHz} \pm 2 \times 10^{-6}$  ( $\pm 21.90 \text{ Hz}$ ).
- 3.1.6 UNDESIRE RF OUTPUTS:
- 3.1.6.1 HARMONIC OR SUBHARMONIC OUTPUT:  $-15 \text{ dBc}$  MAXIMUM (dB RELATIVE TO  $f_0$  CARRIER).
- 3.1.6.2 SPURIOUS OUTPUT:  $-80 \text{ dBc}$  MAXIMUM.
- 3.1.6.3 PHASE NOISE DENSITY: SINGLE SIDED PHASE NOISE DENSITY IN A  $1 \text{ Hz}$  MEASUREMENT BANDWIDTH.

DISPLACEMENT

MIN. LEVEL BELOW ITEM 3.1.2.2 HEREIN

10 Hz	90 DECIBELS (dB)
100 Hz	100 dB
1000 Hz	110 dB
10000 Hz	120 dB

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- 3.1.6.4 RESPONSE TO VIBRATION: DURING VIBRATION, THE TOTAL SINGLE SIDED POWER OF SPURIOUS OUTPUTS AT FREQUENCIES REMOVED FROM  $f_0$  BY 100 HZ TO 30 KHz MUST BE NO GREATER THAN -50 dBc.
- 3.1.6.5 RESPONSE TO SUPPLY RIPPLE: WITH THE SPECIFIED POWER SUPPLY RIPPLE, THE TOTAL POWER OF SPURIOUS OUTPUTS AT FREQUENCIES REMOVED FROM  $f_0$  BY 100 HZ TO 30 KHz MUST BE NO GREATER THAN -57 dBc.
- 3.1.7 BUILT IN TEST (BIT): THE UNIT SHALL INCLUDE CIRCUITRY TO MONITOR PROPER OPERATION OF THE OVEN AND OUTPUT SIGNAL VOLTAGE.
- 3.1.7.1 FAULT CONDITION:
- 3.1.7.1.1 BIT OUTPUT VOLTAGE: 0.8 VOLT MAXIMUM WHEN SINKING 0.1 mA.
- 3.1.7.1.2 RF LEVEL: BIT MUST INDICATE A FAULT CONDITION IF THE OUTPUT VOLTAGE DROPS BELOW 0.1 VRMS (-7 dBm, 50 OHMS).
- 3.1.7.1.3 OVEN TEMPERATURE: BIT MUST INDICATE A FAULT IF THE +20V SUPPLY IS NOT CONNECTED OR DURING INITIAL HIGH CURRENT DRAW ATTRIBUTED TO WARM-UP IN ACCORDANCE WITH 3.1.1.3 SPECIFIED HEREIN.
- 3.1.7.2 OPERATIONAL CONDITION:
- 3.1.7.2.1 BIT OUTPUT VOLTAGE: 3.7 VOLTS MINIMUM WITH A 47K OHM LOAD TO GROUND. 5.0 VOLTS MAXIMUM WITH NO LOAD.
- 3.1.7.2.2 RF LEVEL: BIT MUST INDICATE AN OPERATIONAL CONDITION IF THE OUTPUT VOLTAGE IS ABOVE 0.18 VRMS (-1.9 dBm, 50 OHMS).
- 3.1.7.3 BIT OUTPUT PROTECTION: BIT OUTPUT MUST OPERATE PROPERLY AFTER BEING SHORTED TO THE SUPPLY VOLTAGES OR GROUND FOR 5 SECONDS WHILE IN EITHER THE FAULT OR OPERATIONAL CONDITION.
- 3.2 MECHANICAL:
- 3.2.1 PHYSICAL DIMENSIONS: SHALL BE AS SPECIFIED ON OUTLINE DRAWING. SEE FIGURE 1 HEREIN.
- 3.2.2 WEIGHT: 7.3 OZ. MAXIMUM.
- 3.2.3 CASE TYPE: METAL CAN, HERMETICALLY SEALED.
- 3.2.4 MATERIAL: MANUFACTURERS STANDARD CAPABLE OF WITHSTANDING THE ENVIRONMENTAL REQUIREMENTS OF 3.3 SPECIFIED HEREIN.
- 3.2.5 FINISH: MANUFACTURER'S STANDARD FINISH CAPABLE OF WITHSTANDING THE ENVIRONMENTAL REQUIREMENTS OF 3.3 SPECIFIED HEREIN.

SIZE	CAGEC	DWG NO	REV
A	13499	277-0672	J
SCALE NONE		SHEET 5	